Wants in a Queen

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What Do BC Beekeepers Really Want in a Queen? IT'S TIME TO TELL US!

By Elizabeth Huxter, Project Manager

The BC Bee Breeders' Association (BCBBA) Queen Testing Project (QTP) has just finished the second year of assessing queens for varroa resistance and economic traits.

We will continue to monitor these hives for one more season. To move forward with selecting and breeding from these stocks, we need to know what characters you value. We also need a core of conscientious beekeepers to help monitor future generations of queens.

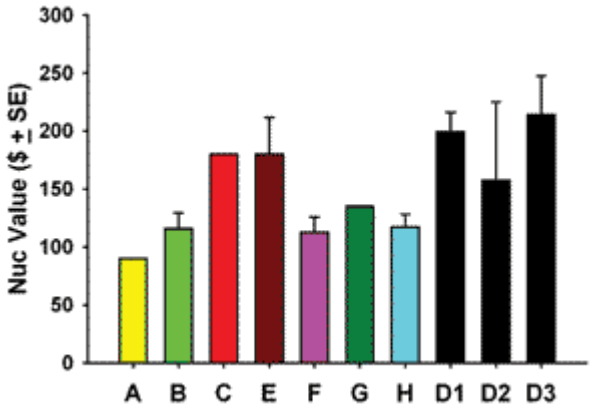
The Tests and their Results This year's main goal was to assess the project queens. The traits we looked at were over wintering and spring build up, honey production, hygienic behavior, disease, swarming tendency, temperament and varroa levels.

Spring Build-up We assessed the amount of brood, pollen and honey reserves in early May.

These are primarily economic traits, so we converted the squares of brood into the number of nucs that could be produced from a hive and, using $90 as a typical value for the brood in a nuc, gave each hive an income value. Figure 1 shows the overall differences between stocks for this economic trait in terms of dollars.

The experimental lines in figure 1 are the queens that we are testing for varroa resistance. The controls are stocks that are commonly used by BC beekeepers. We see that the experimental and control stocks show a fair amount of variation between stocks. The controls have two lines averaging around $200 income from nucs. The experimental lines C and E have slightly lower average incomes, closer to $175.

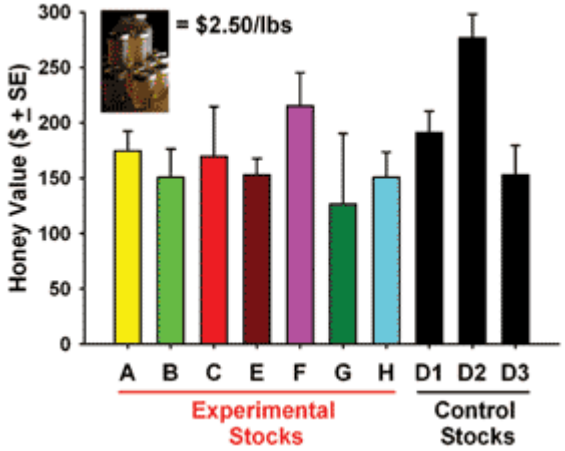
Fig 1



The other five varroa resistant test lines average closer to $110. The small black standard error bars show the amount of variation within the stocks. The larger the bar, the more variation in the stock.

Honey Production We measured the short-term weight gain, total weight gain and fall weights. The second graph (Figure 2) illustrates the average amounts of honey produced for each stock in terms of dollars per pound. Here the D2 line has the highest honey production – ¡ª keep in mind that this line is from southern BC and has the advantage of being bred in an area similar to the test area. Otherwise, the varroa resistant test stocks are comparable with two of the three control stocks. Note that lines C and G show considerable variation between queens within their lines.

Fig 2

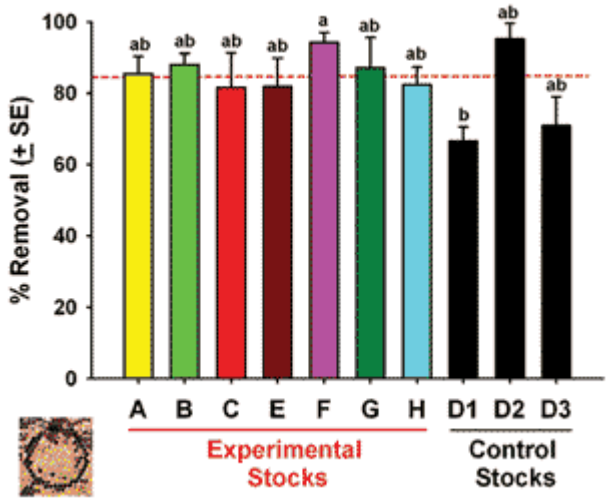


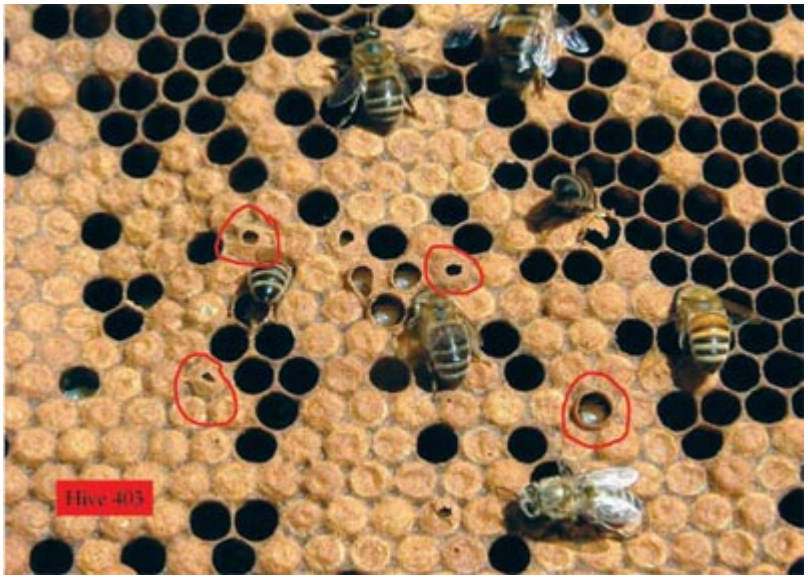
Hygienic Behaviour This test helps to identify hives that quickly clean out wax moth and dead

brood that has resulted from infectious diseases of bees such as chalkbrood and American foulbrood (AFB). High hygienic test results are a prerequisite for

Varroa Sensitive Hygiene (VSH). This trait is important in keeping varroa levels low in high brood producing colonies. Without this trait, greater amounts of brood normally result in higher levels of varroa mites. The third figure (Figure 3) shows the average percent removal of frozen brood for the experimental and control stocks. Note that the averages for the stocks in general are high. Most breeders recognize the importance of this trait. The varroa resistant test stocks all show a high average level of hygienic behavior. The F and D2 lines show the highest average levels for hygienic behavior.

Fig 3





This is a picture of VSH. The bees are uncapping some cells at the light-eyed pupal stages. Other cells are more fully opened and have slightly extended rims.

Disease Resistance Whenever we went into a hive or counted the bottom sticky boards, we recorded any sign of disease. Extremely high levels of chalkbrood infections occurred in only a few hives. Interestingly, hives with high chalkbrood levels usually have very low varroa levels. One or two cells of sac brood were noted in two hives. Several hives with high varroa drops exhibited Parasitic Mite Syndrome (PMS). Hives with disease will not be used as breeders.

Tendency to Swarm and Temperament We recorded the type and approximate number of swarm cells when we were assessing for other traits. We also noted hives with nervous or defensive behaviour. One or two lines seemed to have higher levels of defensive behaviour.

Varroa Mite Infestation Levels We monitored mite levels by using natural drops (ND), treatment drops and alcohol wash tests. The phoretic varroa levels were monitored with a wash of approximately 250 bees taken from the brood nest.

We monitored the hives'natural drops over three days (calculated back to 24 hours) for April, May, July, August and November. Figure 4 is a graph of the natural drops for one yard in April and May. The hive numbers are along the bottom and the number of varroa is on the left axis. The lower line is the number of mites dropping in April for 24 hours and the upper line is the number of mites dropping in May.

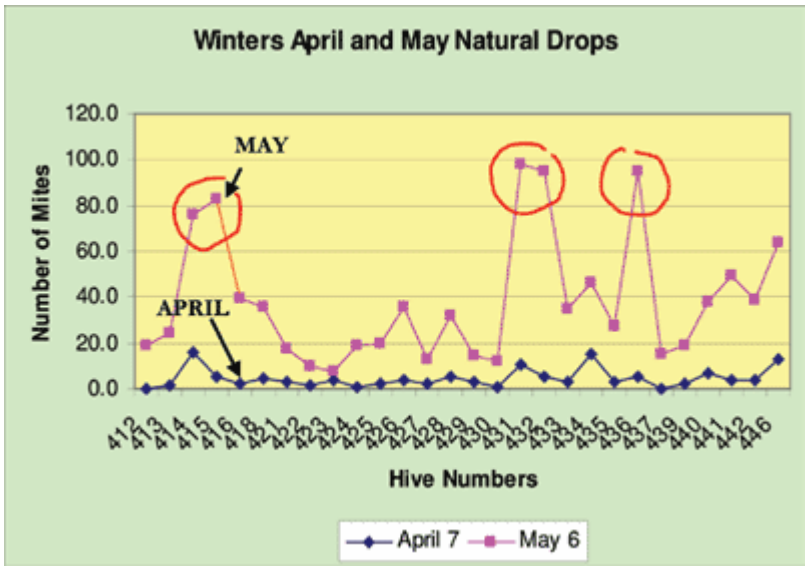


Fig 4

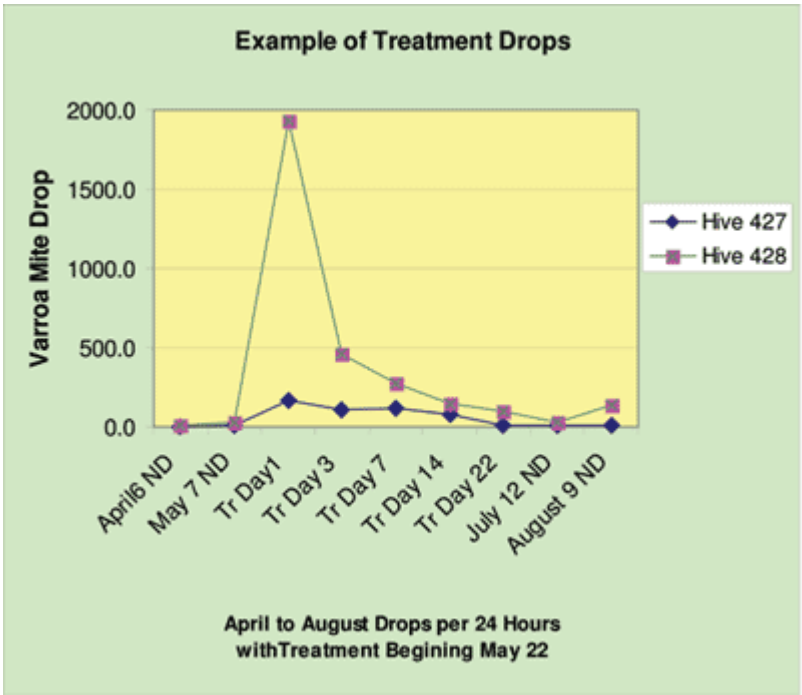


Fig 5

By early May, five hives were dropping between 80 and 100 mites per day! So we treated with Apistan (fluvalinate) and monitored the treatment drops. Figure 5 illustrates two extremes for the initial May natural drops and how the levels changed over time with the Apistan treatment.

Change in Varroa Drops over Two Years with Treatments

No. of Colonies Tested Fall 2007	Line	2006 Fall ND 2006	2007 May Apistan Treatment Drops	2007 Aug 9, 07 ND 24 Hr	**	2007 Nov 7, 07: 24 Hr ND	2007 Varroa Levels	Range of Nov. NDs Maximum Nov 7 ND	Range of Nov. NDs Minimum 7 ND
4	A	2.3	968	9		0.2	Low	0.3	0
9	B	4.7	2097	39		6.2	High	27.0	1
4	C	2.7	745	6		12.7	Low-High.	28.0	1
6	D1	2.0	1679	61		14.3	Med.-High	56.7	1
3	D2	4.8	1248	22		9.2	Medium	18.0	3.7
4	D3	5.2	3082	30		14.6	High	26.0	3.0
7	E	2.0	1820	30		6.2	Medium	23.3	1.3
6	F	2.3	1652	11		4.9	Medium	19.0	0.7
4	G	2.5	1046	18		6.0	Medium	8.7	0.7
9	H	1.9	1469	35		2.3	Medium	13.0	0
4	J		979	21		5.4	Medium	15.3	0
8	VSH*		1559	10		1.8	Low	2.3	0.3

Low Varroa
High Varroa

*VSH = Varroa Sensitive Hygiene Queens introduced May, 2007
**Aug. 20 to Sept. 14 Formic Acid Mite Treatment
D1 is a Vancouver Island Stock,, untested for Varroa Resistance
D2 is a southern BC line that is known to be susceptible to Varroa
D3 stock comes from an area not challenged by varroa.

TABLE 1

Table 1 shows the change in Varroa drops over the two years of monitoring. From this table we see that control lines, and most experimental varroa resistant lines which are kept in the same yard, need at least one treatment a year to keep varroa mite levels low. The most promising is the A Line, which remained low from September 2006 to November 2007. In general, November 2007 average figures indicate all lines except Line A need further treatment to be viable through to the fall of 2008. The recommended November mite ND is one or less mites per day. Our formic acid treatments were not effective in reducing mite loads to safe wintering levels. We found that hives with high varroa counts from May treatment drops continued to stay high throughout 2007. The last two columns of Table 1 show the maximum and minimum ND for each stock in November. So far, only two stocks show consistently low varroa mite levels. The other stocks have greater variability for varroa drops – ¡ª illustrated by the maximum and minimum numbers. In the variable stocks, individual queens may have varroa resistance. These queens will need to be tested by assessing their daughters to see if there is a genetic basis for their individual low varroa levels. In our next article we will describe some of these top queens.

QTP Plans for Next Year: The main goal for next year is to get progeny from the selected queens distributed to BC beekeepers. The Grand Forks team are reserving 20 queens for each club, except the Vancouver Island clubs which will be supplied through Sol Nowitz of Jinglepot Apiaries. Island Beekeepers will need to contact Sol (250-753- 9619,

jinglepotapiaries@telus.net) for the availability of project open mated daughters.

Mainland orders will be prioritized according to the dates the orders are received. So far, the earliest and largest order has come from Alberta! The first queens should be mated in mid-May and the last orders will be filled in late June. Please contact Brenda Jager to order your queens (cell/message 250-755- 5834, brendazbees@uniserve.com). Our second goal for next year is to monitor the original project queens and their daughters. With the high levels of varroa going into winter, we will begin to see if stocks are varroa tolerant next year. We are also hoping to experiment with quick tests for grooming behavior and the VSH trait.

Next Phase of Project We have a good idea of what queens are maintaining low levels of Varroa mites within infested apiaries. Now, we may want to continue breeding from these top queens. Presently, we are formulating plans for a breeding program based on multi-beekeeper testing yards. To adequately test a large number of daughter queens, we hope to distribute daughter queens to several beekeepers who are prepared to introduce them into reasonably uniform hives in terms of size and varroa levels and monitor their performance.

The following year, the top queens from each beekeeper will be sent to a co-coordinating breeder who will isolate mate a new round of daughters and send them back to the beekeepers for monitoring. If funding is available, the participating beekeepers will be taught the necessary protocols at workshops and have the help of a traveling breeder/ technician. Please contact Liz Huxter (250) 442-5204, lizandterry) if you would be interested and would like more details.

What Characteristics Do You Value? Another very important way we need your help is in formulating our selection priorities. What traits do you want to emphasize in our selection of breeders? Most breeding programs chose one or, at the most, two main characters of importance. The Saskatchewan Saskatraz Project's main selection criterion is honey production. The Minnesota Hygienic stock's main selection criteria is hygienic behavior. How do you want us to choose our stock in British Columbia? On pages 29-30 of this issue of Beescene, you will find a survey put together by Adony Melanthopoulos. Please help us by filling it out and sending it to Adony.

*In closing, many thanks to everyone who is making this project possible:. **BIDI**, **BCHPA**, and the **BCBBA** for their financial support; Adony Melathopoulos for making all the bar charts and helping to sort out the results; my editor Diane Dunaway for her talent, patience and good humour; and Brenda Jager for technical support and dedication to the project.*